

THE CLAIMS

WHAT IS CLAIMED IS:

- 5           1. A method of fabricating substrates while minimizing loss of starting material of an ingot, wherein a layer is transferred onto a support, comprising:  
            forming a flat front face on a raw ingot of material;  
10           implanting atomic species through the front face to a controlled mean implantation depth to create a zone of weakness that defines a top layer of the ingot;  
            bonding a support to the front face of the ingot, wherein the support has a surface area that is smaller  
15           than a surface area of the front face of the ingot; and  
            detaching from the ingot at the zone of weakness that portion of the top layer that is bonded to the support to form the substrate.
- 20           2. The method according to claim 1 which further comprises repeating the implanting, bonding and detaching steps at least once.
3. The method according to claim 1 wherein the  
25           front face of the ingot has an outline and the surface area of the support that is bonded to the front face of the ingot has an outline that is positioned within the outline of the front face of the ingot, so that lateral surface(s) of the ingot do not require lapping.
- 30           4. The method according to claim 1 further comprising forming a new flat front face on the ingot after detachment of portions of the top layer.
- 35           5. The method according to claim 4 wherein the forming step includes eliminating residue(s) of an

undetached top layer to obtain a new front face that can be bonded to a new support.

5       6. The method according to claim 1 wherein the front face forming step includes an operation for cutting and lapping the front face of the ingot.

10       7. The method according to claim 1 wherein the implantation step is conducted using sufficiently high energy so that the detached portion has a sufficient thickness to be free-standing.

15       8. The method according to claim 1 wherein the support comprises at least one layer of a monocrystalline or polycrystalline material selected from silicon, silicon carbide, indium phosphide, gallium arsenide and germanium.

20       9. The method according to claim 1 wherein the support is constituted by a plastic, flexible material.

25       10. The method according to claim 1 wherein the support is a gripping tool for transferring the detached portion.

      11. The method according to claim 10 wherein the bonding is accomplished by applying electrostatic forces.

30       12. The method according to claim 10 wherein the bonding is accomplished by applying a pressure differential.

35       13. The method according to claim 1 wherein the support is bonded by molecular bonding.

      14. The method according to claim 1 wherein the support is bonded by eutectic bonding.

15. The method according to claim 1 wherein the support is bonded by applying an adhesive.

5 16. The method according to claim 1 wherein the support is bonded by applying a wax.

17. The method according to claim 1 wherein the support is permanently bonded.

10 18. The method according to claim 1 wherein the support is temporarily bonded.

15 19. The method according to claim 1 wherein detaching the layer of material from the remainder of the ingot is carried out using at least one of applying mechanical stresses, applying electrical stresses, supplying heat energy, and using a chemical etching operation.

20 20. The method according to claim 1 wherein the material of the ingot is monocrystalline and is selected from silicon carbide, silicon, indium phosphide, gallium arsenide, and germanium.

25 21. The method according to claim 1 wherein at least one of the support and the ingot include(s) a layer of an insulator.

30 22. The method according to claim 21 wherein the insulator layer comprises an oxide or a nitride.

35 23. The method according to claim 1 wherein the raw ingot is cut into at least one thick segment when the front face is formed.